

**Attachment A**

Pages 7-15 of the response filed on March 1, 2004

"Amendments to the Claims"

Application Serial No. 09/883,682 filed on June 18, 2001; PHILLIPS, Cory; COMPACT REACTOR ....  
Response to the Official Communication Mailed on August 28, 2003

COLUMBUS/1128038 v.02

**IV. Amendments to the Claims**

Please cancel claims 1, 2, 3, 5, 14, and 23-27; amend claims 4, 6-10, 12, 13, 15-19, 21, 22, 28-32 and add claims 33-43 as follows:

**Claim 1:** CANCELLED.

**Claim 2:** CANCELLED.

**Claim 3:** CANCELLED.

**Claim 4:** (CURRENTLY AMENDED) The reactor of claim ~~3~~ 33 in which orifices in the opposite sides of the "U" are formed in the extending legs of the "U" in a direction transverse to the extending legs.

**Claim 5:** CANCELLED.

**Claim 6:** (CURRENTLY AMENDED) The reactor of claim ~~5~~ 33 including in which the sides of the platform which form a polyhedron open on the side corresponding to a plane formed by extending essentially perpendicularly with respect to an the one or more than one outlet of the one or more than one cavity.

**Claim 7:** (CURRENTLY AMENDED) The reactor of claim 6 including an exhaust cover ~~over~~ enclosing the open side of the polyhedron.

**Claim 8:** (CURRENTLY AMENDED) The reactor of claim 7 including a frit screen disposed between the plane formed by an the one or more than one outlet of the one or more than one cavity and the exhaust cover.

Application Serial No. 09/883,682 filed on June 18, 2001; PHILLIPS, Cory; COMPACT REACTOR ....

Response to the Official Communication Mailed on August 28, 2003

Page 7 of 23

COLUMBUS/1129038 v.03

**Claim 9:** (CURRENTLY AMENDED) The reactor of claim 7 including a frit screen disposed between the plane formed by an the one or more than one inlet of the one or more than one cavity and the platform.

**Claim 10:** (CURRENTLY AMENDED) The reactor of claim 4 33 in which the one or more than one cavity includes a catalyst.

**Claim 11:** (PREVIOUSLY PRESENTED) The reactor of claim 10 in which the catalyst is a powder, granule, pellet or extrudate.

**Claim 12:** (CURRENTLY AMENDED) The reactor of claim 11 in which the catalyst is a powder and the nominal powder size of the powder is greater than 125 microns.

**Claim 13:** (CURRENTLY AMENDED) The reactor of claim 11 including in which the catalyst is a granular granule catalyst having a granule size of about 450 microns.

**Claim 14:** CANCELLED.

**Claim 15:** (CURRENTLY AMENDED) The reactor of claim 6 in which the exhaust cover ~~includes an opening in correspondence with an~~ extends over the one or more than one outlet of the one or more than one cavity.

Application Serial No. 09/883,682 filed on June 18, 2001; PHILLIPS, Cory; COMPACT REACTOR ....  
Response to the Official Communication Mailed on August 28, 2003

Page 8 of 23

COLUMBUS/1129038 v.03

**Claim 16:** (CURRENTLY AMENDED) The reactor of claim 4 33 in which each of the one or more than one cavity has a diameter of at least 1 centimeter.

**Claim 17:** (CURRENTLY AMENDED) The reactor of claim 1 33 in which each of the one or more than one cavity has a length of less than 2.5 centimeters.

**Claim 18:** (CURRENTLY AMENDED) The reactor of claim 4 33 in which the length of each of the one or more than one cavity corresponds to the length of the chamber block.

**Claim 19:** (CURRENTLY AMENDED) The reactor of claim 4 33 including a plurality of cavities in a row by column arrangement.

**Claim 20:** (PREVIOUSLY PRESENTED) The reactor of claim 19 in which the number of rows equals the number of columns.

**Claim 21:** (CURRENTLY AMENDED) The reactor of claim 4 33 including a plurality of cavities in a staggered arrangement.

**Claim 22:** (CURRENTLY AMENDED) The reactor of claim 7 in which the exhaust cover comprises a continuous single exit manifold interconnected with each of the one or more than one outlet of the one or more than one cavity outlet.

Application Serial No. 09/883,682 filed on June 18, 2001; PHILLIPS, Cory; COMPACT REACTOR ....  
Response to the Official Communication Mailed on August 28, 2003

Page 9 of 23

COLUMBUS/1128038 v.03

**Claim 23:** CANCELLED.

**Claim 24:** CANCELLED.

**Claim 25:** CANCELLED.

**Claim 26:** CANCELLED.

**Claim 27:** CANCELLED.

**Claim 28:** (CURRENTLY AMENDED) An assembly of A reactor module comprising more than one or more of the reactors of claim 33 25 or claim 26 connected in parallel such that the reactant products produced by each reactor are exhausted through a common exit.

**Claim 29:** (CURRENTLY AMENDED) A large reactor system reactor comprising a plurality of the assemblies reactor-modules of claim 28 connected in parallel such that the reactant products produced by each reactor are exhausted through a common exit.

**Claim 30:** (CURRENTLY AMENDED) A low-temperature shift reactor in accordance with claim 4 33 in which the one or more than one cavity in the chamber block is charged with one or more than one catalyst selected from the group of Cu-Zn-Al, NM-CoOx, transition metal carbides and nitrides copper-zinc-aluminum; noble metals, platinum, palladium and gold with cerium oxide; transition metal carbides; transition metal nitrides, palladium; palladium alloys, and hydrogen-selective metals.

Application Serial No. 09/883,682 filed on June 18, 2001; PHILLIPS, Cory: COMPACT REACTOR ....

Response to the Official Communication Mailed on August 28, 2003

Page 10 of 23

COLUMBUS/1129038 v.03

**Claim 31:** (CURRENTLY AMENDED) A ~~high-temperature-shift~~ reactor in accordance with claim 4 33 in which one or more than one cavity in the chamber block is charged with one or more than one catalyst selected from the group of Fe-Cr-Al and CoMoAl.

**Claim 32:** (CURRENTLY AMENDED) A reactor in accordance with claim 4 33 having one or more than one cavity in the chamber block charged with one or more than one catalyst selected from the group of mono-, bi- and poly- metallic alloys and oxides of Group IIIB including rare earth metals, Group IVB, Group VB, Group VIB, Group VIIB, Fe, Co, Ni, Cu, Zn, Cd, noble metals, transition metal groups, alkali metal families, Group IA and Group IIA, Group IIIA, Group IVA, Sb, Te, Bi and Se.

**Claim 33:** (NEW): A reactor comprising:

a chamber block having an inlet for the introduction of reactants therein and an outlet for the exit of reactant products therefrom and one or more one than one longitudinal cavity, capable of being charged with a catalyst, extending therethrough from the inlet to the outlet;

one or more than one heat exchanger having first and second opposite sides with micro channel pathways for fluid flow on each side, each heat exchanger having an inlet and an outlet in communication with the pathways on each opposite side thereof, said one or more than

Application Serial No. 09/883,682 filed on June 18, 2001: PHILLIPS, Cory; COMPACT REACTOR ....

Response to the Official Communication Mailed on August 28, 2003

Page 11 of 23

COLUMBUS/1129039 v.03

one heat exchanger being aligned with the chamber block in a relationship in which an outlet of the one or more than one heat exchanger is in communication with an inlet of the one or more than one cavity in the chamber block;

a "U" shaped platform in which opposite sides of the "U" include orifices in operative correspondence with an inlet and an outlet of a heat exchanger, the platform securing the one or more than one heat exchanger and the chamber block in alignment and in which the bottom side of the "U" is spaced apart from the chamber block to define a closed interior channel operatively disposed to allow fluid flow from an outlet of the one or more than one heat exchanger to the inlet of the one or more than one cavity in the chamber block.

**Claim 34: (NEW)** The reactor of claim 12 or claim 13 in which the catalyst is selected from one or more than one of the group of mono-, bi-, and poly-metallic alloys and oxides of:

Group IIIB; rare earth metals; noble metals; transition metals;  
alkali metal families; Group IA; Group IIA; Group IVA; Sb; Te;  
Bi; and Se.

**Claim 35: (NEW)** A reactor comprising:

an upper heat exchanger having first and second opposite sides  
for fluid flow on each side and an inlet and an outlet for fluid flow on

Application Serial No. 09/883,682 filed on June 18, 2001; PHILLIPS, Cory: COMPACT REACTOR ....

Response to the Official Communication Mailed on August 28, 2003

Page 12 of 23

COLUMBUS/1129038 v.03

each opposite side thereof, said upper heat exchanger being aligned with a chamber block in a relationship in which an outlet of the upper heat exchanger is in communication with a fluid flow inlet for a chamber block;

a chamber block having an inlet on one side for the introduction of a fluid flow therein, an outlet on the opposite side for the exit of a fluid flow therefrom, and a plurality of longitudinally cavities extending therethrough from the inlet on one side to the outlet on the other side, the cavities being charged with a catalyst;

a lower heat exchanger having first and second opposite sides for fluid flow on each side and an inlet and an outlet for fluid flow on each opposite side thereof, said lower heat exchanger being aligned with the chamber block in a relationship in which an outlet of the lower heat exchanger is in communication with a fluid flow inlet for the chamber block;

a platform securing the upper heat exchanger, the chamber block, and the lower heat exchanger in a serial alignment;

orifices for fluid flow in operative correspondence with the inlets and outlets of the heat exchangers; and

a channel for fluid flow operatively disposed with respect to the platform to allow fluid flow from the outlets of the heat exchangers to the inlet of the chamber block.

Application Serial No. 09/883,682 filed on June 18, 2001; PHILLIPS, Cory; COMPACT REACTOR ....

Response to the Official Communication Mailed on August 28, 2003

Page 13 of 23

COLUMBUS/1126039 v.03



**Claim 36: (NEW)** The reactor of claim 35 including an exhaust cover enclosing the outlet of the chamber block.

**Claim 37: (NEW)** The reactor of claim 35 including a screen disposed adjacent the inlet of the chamber block.

**Claim 38: (NEW)** The reactor of claim 35 including a screen disposed adjacent the outlet of the chamber block.

**Claim 39: (NEW)** An assembly of a plurality of the reactors of claim 35 connected in parallel such that fluid flow products produced by each reactor are exhausted through a common exit.

**Claim 40: (NEW)** A system comprising a plurality of the assemblies of claim 39 connected in parallel such that the fluid flow products produced by each reactor are exhausted through a common exit.

**Claim 41: (NEW)** A reactor in accordance with claim 35 in which cavities in the chamber block are charged with one or more than one catalyst selected from the group of copper-zinc-aluminum; noble metals, platinum, palladium and gold

Application Serial No. 09/683,682 filed on June 18, 2001; PHILLIPS, Cory; COMPACT REACTOR .....

Response to the Official Communication Mailed on August 28, 2003

Page 14 of 23

COLUMBUS/1129038 v.03

with cerium oxide; transition metal carbides; transition metal nitrides, palladium; palladium alloys, and hydrogen-selective metals.

**Claim 42:** (NEW) A reactor in accordance with claim 35 in which cavities in the chamber block are charged with one or more than one catalyst selected from the group of Fe-Cr-Al and CoMoAl.

**Claim 43:** (NEW) A reactor in accordance with claim 35 in which cavities in the chamber block are charged with catalyst selected from one or more than one of the group of mono-, bi-, and poly- metallic alloys and oxides of:

Group IIIB; rare earth metals; noble metals; transition metals;  
alkali metal families; Group IA; Group IIA; Group IVA; Sb; Te;  
Bi; and Se.

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Application Serial No. 09/883,682 filed on June 18, 2001: PHILLIPS, Cory; COMPACT REACTOR ....  
Response to the Official Communication Mailed on August 28, 2003

Page 15 of 23

COLUMBUS/112803B v.03